DMOPC '17 Contest 1 P6 - Land of the Carrot Trees

Time limit: 4.5s **Memory limit:** 256M

A long time ago, in the not-so-distant LCT (land of the carrot trees), where carrots grow on trees, lived a magical carrot. In this magical land, there were N cities numbered $1, 2, \ldots, N$, connected with $N-1$ roads, with no cycles. Over the course of Q days, some interesting things happened to the roads:

- `A x y z`: A new road of durability z is built between cities x and y
- `R x y`: The road between cities x and y is destroyed by a rampaging rabbit (it is guaranteed to exist prior to the operation)
- `Q x y`: The eccentric king demanded to know the XOR of the durability of all roads on the path between cities x and y

It is guaranteed that there will be at most one path between any two cities at any point in time.

Can you help the people of LCT by implementing a program to simulate these events?

Constraints

For all subtasks:

The durability of a path will be a positive integer in the range $[1, 10^6]$.

Subtask 1 [20%]

$1 \leq N \leq 1\,000$

$1 \leq Q \leq 1\,000$

Subtask 2 [80%]

$1 \leq N \leq 10^5$

$1 \leq Q \leq 10^5$

Input Specification

The first line of input will have two integers, N and Q.
The next $N-1$ lines will contain three integers, a_i, b_i, c_i, indicating there is a road of durability c_i between cities a_i and b_i.
The next Q lines will each contain a valid query.

Output Specification

For each `Q` query, print the answer to it on a new line. If the two cities are not connected, output `-1`.

Sample Input 1

```
5 4
1 2 3
2 4 5
3 5 6
2 3 8
R 3 2
A 3 1 6
Q 5 4
Q 3 2
```

Sample Output 1

```
6
5
```

Sample Input 2

```
6 8
1 2 3
3 4 5
4 5 6
4 1 8
6 1 4
Q 6 5
Q 3 2
R 4 3
R 4 1
A 1 3 8
Q 3 2
Q 4 5
Q 6 1
```

Sample Output 2

```
10
14
11
6
4
```